

**AMENDMENTS TO THE CLAIMS**

**This listing of claims will replace all prior versions and listings of claims in the application:**

**LISTING OF CLAIMS:**

Claim 1: (currently amended): An organically-functionalized carbon nanocapsule, comprising:

a hollow carbon nanocapsule; and

at least one kind of organic functional groups bonded thereon,

wherein the organically-functionalized carbon nanocapsule is of the following formula:

$F(-E)_n$ , in which F is the carbon nanocapsule, E is the organic functional group, and n is the number of the organic functional group.

Claim 2: (original): The organically-functionalized carbon nanocapsule as claimed in claim 1, wherein the carbon nanocapsule is a polyhedral carbon cluster constituting multiple graphite layers having a balls-within-a ball structure, and the diameter of a carbon nanocapsule is 3-100 nm.

Claim 3-4: (canceled).

Claim 5: (original): The organically-functionalized carbon nanocapsule as claimed in claim 1, wherein n is 1-100,000.

Claim 6: (currently amended) The organically-functionalized carbon nanocapsule as claimed in claim 1, wherein each E is independently E<sub>1</sub>, E<sub>2</sub>, E<sub>3</sub>, E<sub>4</sub> or E<sub>5</sub>, in which each E<sub>1</sub>, independently, is Y<sub>1</sub>, Y<sub>2</sub>-amino, (Y<sub>1</sub>, Y<sub>2</sub>-alkyl)amino, Y<sub>1</sub>, Y<sub>2</sub>-ethylenediamino, (dihydroxymethyl)alkylamino, (X<sub>1</sub>, X<sub>3</sub>-aryl)amino, or X<sub>1</sub>, X<sub>3</sub>-aryloxy; each E<sub>2</sub>, independently, is Y<sub>1</sub>, Y<sub>2</sub>-alkoxy, (Y<sub>1</sub>, Y<sub>2</sub>-amino)alkoxy, (Y<sub>1</sub>, Y<sub>2</sub>, Y<sub>3</sub>-aryl)oxy, (dihydroxyalkyl)aryloxy, (Y<sub>1</sub>, Y<sub>2</sub>, Y<sub>3</sub>-alkyl)amino, (Y<sub>1</sub>, Y<sub>2</sub>, Y<sub>3</sub>-aryl)amino, or dihydroxyalkylamino; each E<sub>3</sub>, independently, is Y<sub>1</sub>, Y<sub>2</sub>, Y<sub>3</sub>-alkoxy, (trihydroxyalkyl)alkoxy, (trihydroxyalkyl)alkylamino, (dicarboxyalkyl)amino, (Y<sub>1</sub>, Y<sub>2</sub>, Y<sub>3</sub>-alkyl)thio, (X<sub>1</sub>, X<sub>2</sub>-aryl)thio, (Y<sub>1</sub>, Y<sub>2</sub>-alkyl)thio, (dihydroxyalkyl)thio, Y<sub>1</sub>, Y<sub>2</sub>-dioxoalkyl; each E<sub>4</sub>, independently, is ((glycosidyl)oxoheteroaryl)amino, ((glycosidyl)oxoaryl)amino, (X<sub>1</sub>, X<sub>2</sub>, X<sub>3</sub>-heteroaryl)amino, (X<sub>1</sub>-diarylketone)amino, (X, X<sub>1</sub>-oxoaryl)amino, (X, X<sub>1</sub>-dioxoaryl) amino, (Y<sub>1</sub>-alkyl, Y<sub>2</sub>-alkyldioxoheteroaryl)amino, (Y<sub>1</sub>-alkyl, Y<sub>2</sub>-alkyldioxoaryl)amino, (di(Y<sub>1</sub>, Y<sub>2</sub>-methyl)dioxoheteroaryl)amino, (di(Y<sub>1</sub>, Y<sub>2</sub>-methyl)dioxoaryl)amino, ((glycosidyl)heteroaryl)amino, ((glycosidyl)aryl)amino, ((carboxylacetylalkyl)oxoheteroaryl)amino, ((carboxylacetylalkyl)oxoaryl)amino, ((isopropylaminohydroxyalkoxy)aryl)amino, or (X<sub>1</sub>, X<sub>2</sub>, X<sub>3</sub>-alkylaryl)amino; each E<sub>5</sub>, independently, is (X<sub>1</sub>, X<sub>2</sub>, X<sub>3</sub>-heteroaryl)oxy, (isopropylaminohydroxyalkyl)aryloxy, (X<sub>1</sub>, X<sub>2</sub>, X<sub>3</sub>-oxoheteroaryl)oxy, (X<sub>1</sub>, X<sub>2</sub>, X<sub>3</sub>-oxoaryl)oxy, (X<sub>1</sub>, Y<sub>1</sub>-oxoheteroaryl)oxy, (X<sub>1</sub>-diarylketone)oxy, (X, X<sub>1</sub>-oxoaryl)oxy, (X<sub>1</sub>, X<sub>2</sub>-dioxoaryl)oxy, (Y<sub>1</sub>, Y<sub>2</sub>, di-aminodihydroxy)alkyl, (X<sub>1</sub>, X<sub>2</sub>-heteroaryl)thio, ((tricarboxylalkyl)ethylenediamino)alkoxy, (X<sub>1</sub>, X<sub>2</sub>-oxoaryl)thio, (X<sub>1</sub>, X<sub>2</sub>-

dioxoaryl)thio, (glycosidylheteroaryl)thio, (glycosidylaryl)thio, Y<sub>1</sub>-alkyl(thiocarbonyl)thio, Y<sub>1</sub>, Y<sub>2</sub>-alkyl(thiocarbonyl)thio, Y<sub>1</sub>, Y<sub>2</sub>, Y<sub>3</sub>-alkyl(thiocarbonyl)thio, (Y<sub>1</sub>, Y<sub>2</sub>-aminothiocarbonyl)thio, (pyranosyl)thio, cysteinyl, tyrosinyl, (phenylalanyl)amino, (dicarboxyalkyl)thio, (aminoaryl)<sub>1-20</sub> amino, or (pyranosyl)amino;

each X, independently, is halide; each of X<sub>1</sub> and X<sub>2</sub>, independently, is --H, --Y<sub>1</sub>, --O--Y<sub>1</sub>, --S--Y<sub>1</sub>, --NH--Y<sub>1</sub>, --CO--O--Y<sub>1</sub>, --O--CO--Y<sub>1</sub>, --CO--NH--Y<sub>1</sub>, --CO--NY<sub>1</sub>Y<sub>2</sub>, --NH--CO--Y<sub>1</sub>, --SO<sub>2</sub>--Y<sub>1</sub>, --CHY<sub>1</sub>Y<sub>2</sub>, or --NY<sub>1</sub>Y<sub>2</sub>; each X<sub>3</sub>, independently, is --Y<sub>1</sub>, --O--Y<sub>1</sub>, --S--Y<sub>1</sub>, --NH--Y<sub>1</sub>, --CO--O--Y<sub>1</sub>, --O--CO--Y<sub>1</sub>, --CO--NH--Y<sub>1</sub>, --CO--NY<sub>1</sub>Y<sub>2</sub>, --NH--CO--Y<sub>1</sub>, --SO<sub>2</sub>--Y<sub>1</sub>, --CHY<sub>1</sub>Y<sub>2</sub> or --NY<sub>1</sub>Y<sub>2</sub>;

each of Y<sub>1</sub>, Y<sub>2</sub> and Y<sub>3</sub>, independently, is --B--Z;

each B, independently, is --R<sub>a</sub>--O--[Si(CH<sub>3</sub>)<sub>2</sub>--O--]<sub>1-100</sub>, C<sub>1-2000</sub> alkyl, C<sub>6-40</sub> aryl, C<sub>7-60</sub> alkylaryl, C<sub>7-60</sub> arylalkyl, (C<sub>1-30</sub> alkyl ether)<sub>1-100</sub>, (C<sub>6-40</sub> aryl ether)<sub>1-100</sub>, (C<sub>7-60</sub> alkylaryl ether)<sub>1-100</sub>, (C<sub>7-60</sub> arylalkyl ether)<sub>1-100</sub>, (C<sub>1-30</sub> alkyl thioether)<sub>1-100</sub>, (C<sub>6-40</sub> aryl thioether)<sub>1-100</sub>, (C<sub>7-60</sub> alkylaryl thioether)<sub>1-100</sub>, (C<sub>7-60</sub> arylalkyl thioether)<sub>1-100</sub>, (C<sub>2-50</sub> alkyl ester)<sub>1-100</sub>, (C<sub>7-60</sub> aryl ester)<sub>1-100</sub>, (C<sub>8-70</sub> alkylaryl ester)<sub>1-100</sub>, (C<sub>8-70</sub> arylalkyl ester)<sub>1-100</sub>, --R--CO--O--(C<sub>1-30</sub> alkyl ether)<sub>1-100</sub>, --R--CO--O--(C<sub>6-40</sub> aryl ether)<sub>1-100</sub>, --R--CO--O--(C<sub>7-60</sub> alkylaryl ether)<sub>1-100</sub>, --R--CO--O--(C<sub>7-60</sub> arylalkyl ether)<sub>1-100</sub>, (C<sub>4-50</sub> alkyl urethane)<sub>1-100</sub>, (C<sub>14-60</sub> aryl urethane)<sub>1-100</sub>, (C<sub>10-80</sub> alkylaryl urethane)<sub>1-100</sub>, (C<sub>10-80</sub> arylalkyl urethane)<sub>1-100</sub>, (C<sub>5-50</sub> alkyl urea)<sub>1-100</sub>, (C<sub>14-60</sub> aryl urea)<sub>1-100</sub>, (C<sub>10-80</sub> alkylaryl urea)<sub>1-100</sub>, (C<sub>10-80</sub> arylalkyl urea)<sub>1-100</sub>, (C<sub>2-50</sub> alkyl amide)<sub>1-100</sub>, (C<sub>7-60</sub> aryl amide)<sub>1-100</sub>, (C<sub>8-70</sub> alkylaryl amide)<sub>1-100</sub>, (C<sub>8-70</sub> arylalkyl amide)<sub>1-100</sub>, (C<sub>3-30</sub> alkyl anhydride)<sub>1-100</sub>, (C<sub>8-50</sub> aryl anhydride)<sub>1-100</sub>, (C<sub>9-60</sub> alkylaryl anhydride)<sub>1-100</sub>, (C<sub>9-60</sub> arylalkyl anhydride)<sub>1-100</sub>, (C<sub>2-30</sub> alkyl carbonate)<sub>1-100</sub>, (C<sub>7-50</sub> aryl carbonate)<sub>1-100</sub>, (C<sub>8-60</sub> alkylaryl carbonate)<sub>1-100</sub>, (C<sub>8-60</sub> arylalkyl

carbonate)<sub>1-100</sub>, --R<sub>1</sub>--O--CO--NH--(R<sub>2</sub> or Ar--R<sub>2</sub>--Ar)--NH--CO--O--(C<sub>1-30</sub> alkyl ether, C<sub>6-40</sub> aryl ether, C<sub>7-60</sub> alkylaryl ether, or C<sub>7-60</sub> arylalkyl ether)<sub>1-100</sub>, --R<sub>1</sub>--O--CO--NH--(R<sub>2</sub> or Ar--R<sub>2</sub>--Ar)--NH--CO--O--(C<sub>2-50</sub> alkyl ester, C<sub>7-60</sub> aryl ester, C<sub>8-70</sub> alkylaryl ester, or C<sub>8-70</sub> arylalkyl ester)<sub>1-100</sub>, --R<sub>1</sub>--C--CO--NH--(R<sub>2</sub> or Ar--R<sub>2</sub>--Ar)--NH--CO--O--(C<sub>1-30</sub> alkyl ether, C<sub>6-40</sub> aryl ether, C<sub>7-60</sub> alkylaryl ether, or C<sub>7-60</sub> arylalkyl ether)<sub>1-100</sub>, --CO--NH--(R<sub>2</sub> or Ar--R<sub>2</sub>--Ar)--NH--CO--O--, --R<sub>1</sub>--O--CO--NH--(R<sub>2</sub> or Ar--R<sub>2</sub>--Ar)--NH--CO--O--(C<sub>2-50</sub> alkyl ester, C<sub>7-60</sub> aryl ester, C<sub>8-70</sub> alkylaryl ester, or C<sub>8-70</sub> arylalkyl ester)<sub>1-100</sub>, --R<sub>3</sub>--O--CO--NH--(R<sub>2</sub> or Ar--R<sub>2</sub>--Ar)--NH--CO--O--, --R<sub>1</sub>--NH--CO--NH--(R<sub>2</sub> or Ar--R<sub>2</sub>--Ar)--NH--CO--O--(C<sub>1-30</sub> alkyl ether, C<sub>6-40</sub> aryl ether, C<sub>7-60</sub> alkylaryl ether, or C<sub>7-60</sub> arylalkyl ether)<sub>1-100</sub>, --R<sub>1</sub>--NH--CO--NH--(R<sub>2</sub> or Ar--R<sub>2</sub>--Ar)--NH--CO--O--(C<sub>2-50</sub> alkyl ester, C<sub>7-60</sub> aryl ester, C<sub>8-70</sub> alkylaryl ester, or C<sub>8-70</sub> arylalkyl ester)<sub>1-100</sub>, --R<sub>1</sub>--NH--CO--NH--(R<sub>2</sub> or Ar--R<sub>2</sub>--Ar)--NH--CO--O--(C<sub>1-30</sub> alkyl ether, C<sub>6-40</sub> aryl ether, C<sub>7-60</sub> alkylaryl ether, or C<sub>7-60</sub> arylalkyl ether)<sub>1-100</sub>, --CO--NH--(R<sub>2</sub> or Ar--R<sub>2</sub>--Ar)--NH--CO--O--, --R<sub>1</sub>--NH--CO--NH--(R<sub>2</sub> or Ar--R<sub>2</sub>--Ar)--NH--CO--O--(C<sub>2-50</sub> alkyl ester, C<sub>7-60</sub> aryl ester, C<sub>8-70</sub> alkylaryl ester, or C<sub>8-70</sub> arylalkyl ester)<sub>1-100</sub>, --R<sub>3</sub>--O--CO--NH--(R<sub>2</sub> or Ar--R<sub>2</sub>--Ar)--NH--CO--O--, --R<sub>1</sub>--O--CO--NH--(R<sub>2</sub> or Ar--R<sub>2</sub>--Ar)--NH--CO--NH--(C<sub>2-50</sub> alkyl amide, C<sub>7-60</sub> aryl amide, C<sub>8-70</sub> alkylaryl amide, or C<sub>8-70</sub> arylalkyl amide)<sub>1-100</sub>, or --R<sub>1</sub>--NH--CO--NH--(R<sub>2</sub> or Ar--R<sub>2</sub>--Ar)NH--CO--NH--(C<sub>2-50</sub> alkyl amide, C<sub>7-60</sub> aryl amide, C<sub>8-70</sub> alkylaryl amide, or C<sub>8-70</sub> arylalkyl amide)<sub>1-100</sub>;

each Z, independently, is ~~--C--D--C--D--~~, wherein each C, independently, is --R--, --R--Ar--, --Ar--R--, or --Ar--; and each D, independently, is --OH, --SH, --NH<sub>2</sub>, --NHOH, --SO<sub>3</sub>H, --OSO<sub>3</sub>H, --COOH, --CONH<sub>2</sub>, --CO--NH--NH<sub>2</sub>, --CH(NH<sub>2</sub>)--COOH, --P(OH)<sub>3</sub>, --PO(OH)<sub>2</sub>, --O--PO(OH)<sub>2</sub>, --O--PO(OH)--O--PO(OH)<sub>2</sub>, --O--PO(O<sup>-</sup>)--O--CH<sub>2</sub>CH<sub>2</sub>NH<sub>3</sub><sup>+</sup>, -glycoside, --OCH<sub>3</sub>,

$--O--CH_2--(CHOH)_4--(CH_2)_4--CH$ ,  $--O--CH_2--(CHOH)_2--CHOH$ ,  $--C_6H_3(OH)_2$ ,  $--NH_3^+$ ,  
 $--N^+HR_bR_c$ , or  $N^+HR_bR_cR_d$ ; wherein each of  $R$ ,  $R_1$ ,  $R_2$ ,  $R_3$ ,  $R_a$ ,  $R_b$ ,  $R_c$ , and  $R_d$  independently, is  
 $C_{1-30}$  alkyl, each  $Ar$ , independently, is aryl.

Claim 7: (original): The organically-functionalized carbon nanocapsule as claimed in claim 1, wherein the carbon nanocapsule is functionalized by a redox reaction.

Claim 8: (original) The organically-functionalized carbon nanocapsule as claimed in claim 1, wherein the carbon nanocapsule is functionalized by a cycloaddition reaction .

Claim 9: (original) The organically-functionalized carbon nanocapsule as claimed in claim 1, wherein the carbon nanocapsule is functionalized by a radical addition reaction.

Claim 10: (currently amended) An organically-functionalized carbon nanocapsule, comprising:

a hollow carbon nanocapsule; and

at least one kind of organic functional groups bonded thereon,

wherein the organically-functionalized carbon nanocapsule is of the following formula:

$F(-E)_n$ , in which  $F$  is the carbon nanocapsule,  $E$  is the organic functional group selected from  $-OH$ ,  $-C=O$ ,  $-CHO$  or  $-COOH$ ,  $n$  is the number of the organic functional group, and the carbon nanocapsule  $F$  is functionalized by a redox reaction.

Claim 11: (original) The organically-functionalized carbon nanocapsule as claimed in claim 10, wherein the carbon nanocapsule is a polyhedral carbon cluster constituting multiple graphite layers having a balls-within-a ball structure, and the diameter of a carbon nanocapsule is 3-100 nm.

Claims 12-13: (cancelled).

Claim 14: (original) The organically-functionalized carbon nanocapsule as claimed in claim 10, wherein n is 1-100,000.

Claim 15: (currently amended) An organically-functionalized carbon nanocapsule, comprising:

a hollow carbon nanocapsule; and

at least one kind of organic functional groups bonded thereon,

wherein the organically-functionalized carbon nanocapsule is of the following formula:

$F(-E)_n$ , in which F is the carbon nanocapsule, E is the organic functional group selected from  $-NHAr$ ,  $-N^+(CH_3)_2Ar$ ,  $=CCl_2$  or amino group, n is the number of the organic functional group, and the carbon nanocapsule F is functionalized by a cycloaddition reaction.

Claim 16: (original) The organically-functionalized carbon nanocapsule as claimed in claim 15, wherein the carbon nanocapsule is a polyhedral carbon cluster constituting multiple

graphite layers having a balls-within-a ball structure, and the diameter of a carbon nanocapsule is 3-100 nm.

Claims 17-18: (cancelled).

Claim 19: (original) The organically-functionalized carbon nanocapsule as claimed in claim 15, wherein n is 1-100,000.

Claim 20: (currently amended) An organically-functionalized carbon nanocapsule, comprising:

a hollow carbon nanocapsule; and

at least one kind of organic functional groups bonded thereon,

wherein the organically-functionalized carbon nanocapsule is of the following formula:

$F(-E)_n$ , in which F is the carbon nanocapsule, E is the organic functional group selected from -OH,  $-\text{OSO}_3^-$ ,  $-\text{C}(\text{CH}_3)_2\text{COOCH}_3$  or  $-\text{C}(\text{CH}_3)_2\text{CN}$ , n is the number of the organic functional group, and the carbon nanocapsule F is functionalized by a radical addition reaction.

Claim 21: (original) The organically-functionalized carbon nanocapsule as claimed in claim 20, wherein the carbon nanocapsule is a polyhedral carbon cluster constituting multiple graphite layers having a balls-within-a ball structure, and the diameter of a carbon nanocapsule is 3-100 nm.

Amendment Under 37 C.F.R. § 1.111  
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Claims 22-23: (cancelled).

Claim 24: (original) The organically-functionalized carbon nanocapsule as claimed in claim 20, wherein n is 1-100,000.